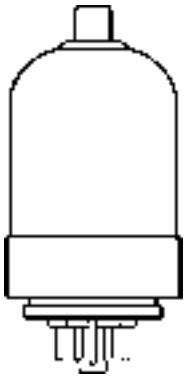


PL6146B

Beam Power Tetrode

The PL6146B is a small, lightweight beam-power pentode designed for service as a very high frequency amplifier. It has a short sturdy structure and is ideal for mobile and compact stationary equipment. Due to its superior design, the Penta PL6146B has high power sensitivity, high perveance, and low driving power requirements.

The heater-cathode structure of the PL6146B is designed to supply ample tube current with heater voltages from 6.0 to 7.5 volts; however the tube will perform satisfactorily with heater voltages ranging from 5 to 8 volts. Satisfactory operation throughout a wide range of supply voltages makes possible reliable performance under the conditions normally encountered in mobile service.

Adequate shielding and effective RF grounding are facilitated by the cathode, grid 3, and internal shield all of which are connected to 3 base pins. Isolation of output from input is further enhanced by a top-cap plate connection.

ELECTRICAL CHARACTERISTICS

Cathode	Coated Unipotential
Heater Voltage	6.3 Volts
Heater Current	1.25 Amperes
Minimum Preheat Time	60 Seconds
Amplification Factor	4.5
Interelectrode Capacitances	
Grid 1 to Plate	0.22 max pf
Grid 1 to All except plate	13 pf
Plate to All except Grid 1	8.5 pf
Transconductance (Eb=300V, Ib=70mA)	7000 mhos

MECHANICAL CHARACTERISTICS

Maximum Overall Length	4.125 inches
Seated Length	3.500 inches
Diameter	1.563 inches
Mounting Position	Any
Weight (approx)	2.3 ounces
Cap	JEDEC C1-1
Base	Octal

(Revised 11/08/99)

P E N T A L A B O R A T O R I E S

9740 COZYCROFT AVENUE * CHATSWORTH * CALIFORNIA 91311

(800) 421-4219 * (818) 882-3872 * FAX: (818) 882-3968

ELECTRON TUBES FOR INDUSTRY

MAXIMUM RATINGS -- CCS (Continuous Commercial Service)

	AF Power Amplifier		RF Power Amplifier		
	Class AB_1	Class AB_2	Class AB_1	Class C Telephony	
D-C Plate Voltage	600	600	600	480	Max. Volts
D-C Grid 2 Voltage	250	250	250	250	Max. Volts
D-C Grid 1 Voltage	----	----	----	-150	Max. Volts
D-C Plate Current[1]	175	175	175	145	Max. mA
D-C Grid 1 Current	----	----	----	3.5	Max. mA
D-C Plate Power Input[1]	90	90	----	60	Max. Watts
D-C Grid 2 Power Input[1]	3	3	3	2	Max. Watts
Plate Dissipation[1]	27	27	27	18	Max. Watts
Cathode to Heater Voltage	135	135	135	135	Max. Watts
Grid 1 Circuit Resistance[2, 6]	100K	30K	----	30K	Max. Ω

TYPICAL OPERATING CHARACTERISTICS --Class AB_1 A-F Power Amplifier or Modulator (Two tubes in Push-Pull)

	CCS	ICAS	
Plate Voltage	600	750	Volts
Grid 2 Voltage[3]	200	200	Volts
Grid 1 Voltage (Fixed Bias)	-47	-48	Volts
Peak Signal Grid 1-to-Grid 1 Voltage[4]	94	96	Volts
Peak Signal Driving Power[4]	0	0	Watts
Plate Current with Zero Signal	48	50	mA
Plate Current with Maximum Signal	250	250	mA
Grid 2 Current with Maximum Signal	14.8	12.6	mA
Plate-to-Plate Load Resistance	5600	7200	Ω
Peak Signal Power Output	96	124	Watts

TYPICAL OPERATING CHARACTERISTICS --Class AB_2 (Two tubes in Push-Pull)

	CCS		ICAS		
Plate Voltage	500	600	600	750	Volts
Grid 2 Voltage	200	200	200	150	Volts
Grid 1 Voltage (Fixed Bias)	-46	-48	-47	-39	Volts
Peak Signal Grid 1-to-Grid 1 Voltage[4]	108	106	114	110	Volts
Peak Signal Driving Power[4]	0.2	0.7	0.2	0.5	Watts
Plate Current with Zero Signal	50	40	50	40	mA
Plate Current with Maximum Signal	308	270	328	294	mA
Grid 2 Current with Maximum Signal	26	27	26	28	mA
Peak Signal Grid 1 Current	2.7	1.3	3.4	7.6	mA
Plate-to-Plate Load Resistance	3620	5200	4160	6050	Ω
Peak Signal Power Output	100	110	130	148	Watts

TYPICAL OPERATING CHARACTERISTICS --Class AB_1 Linear R-F Power Amplifier (Two-Tone Modulation)

	CCS	ICAS	
Plate Voltage	600	750	Volts
Grid 2 Voltage[3]	200	200	Volts
Grid 1 Voltage[3]	-47	-48	Volts
Zero-Signal Plate Current	24	25	mA
Peak Envelope Plate Current	125	125	mA
Average Plate Current	86	86	mA
Effective R-F Load Resistance	2800	3600	Ω
Peak Envelope Grid 2 Current	7.4	6.3	mA
Average Grid 2 Current	5	3.9	mA
Distortion Product (Third Order)[5]	24	26	dB
Distortion Product (Fifth Order)[5]	30	31	dB
Average Power Output	24.5	30.5	Watts
Peak Power Output	49	61	Watts
Frequency	30	30	MHz

TYPICAL OPERATING CHARACTERISTICS --Class C Telephony, Plate Modulated R-F Power Amplifier or Oscillator

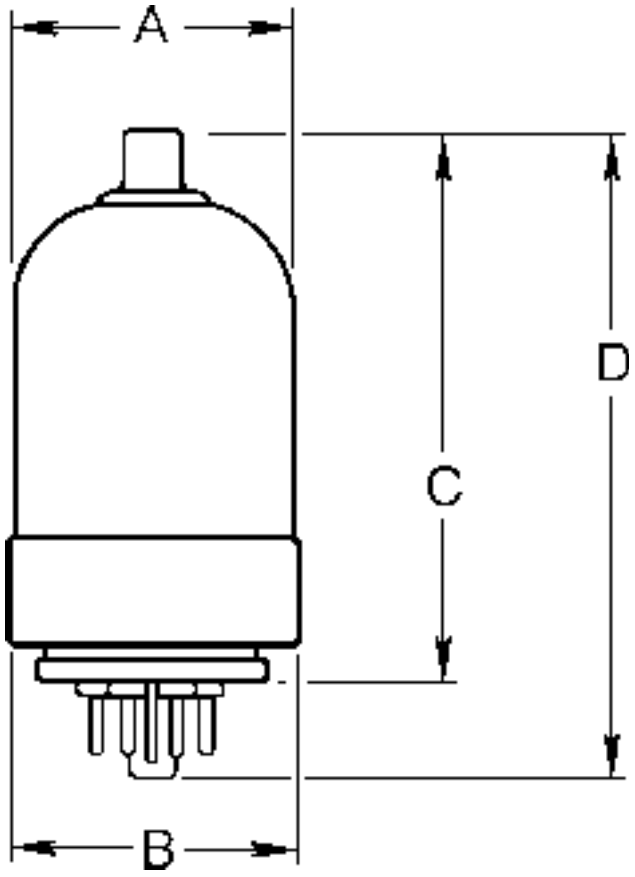
	CCS	ICAS	
Plate Voltage	475	600	Volts
Grid 2 Voltage[7]	165	175	Volts
Grid 1 Voltage[8]	-86	-92	Volts
Grid 1 Resistor	26,000	27,000	Ω
Peak R-F Driving Signal Voltage	106	114	Volts
Peak R-F Driving Signal Power	0.4	0.5	Watts
Plate Current	125	140	mA
Grid 2 Current	8.5	9.5	mA
Grid 1 Current	3.3	3.4	mA
Power Output	42	62	Watts

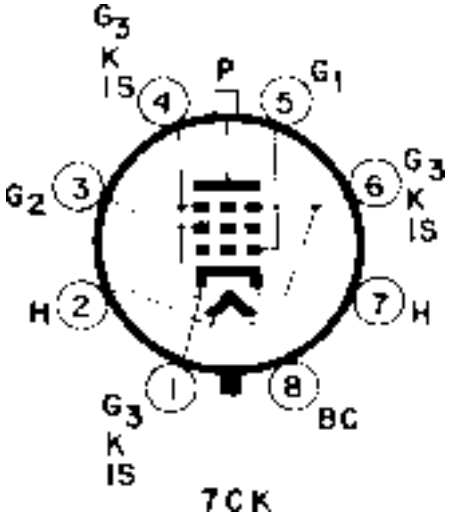
TYPICAL OPERATING CHARACTERISTICS --Class AB_2 (Two tubes in Push-Pull)

	CCS	ICAS	CCS	ICAS		
Frequency	Up to 60 MHz		175 MHz			
Plate Voltage	600	750	320	400	435	Volts
Grid 2 Voltage[3]	200	200	210	220	230	Volts
Grid 1 Voltage[8]	-70	-77	-52	-55	-56	Volts
Grid 1 Resistor	24,000	28,000	26,000	30,000	24,000	Ω
Peak R-F Driving Signal Voltage	90	95	65	67	73	Volts
Peak R-F Driving Signal Power	0.3	0.3	2	2	3	Watts
Plate Current	150	160	170	180	210	mA
Grid 2 Current	10	10	12	12	11	mA
Grid 1 Current	2.8	2.7	2	1.9	2.3	mA
Power Output	63	85	29	40	50	Watts

NOTES:

1. Average value over any A-F sine wave cycle
2. Input-coupling used in Grid 1 should avoid introducing excessive resistance. Impedance or transformer coupling arrangements are highly recommended.
3. Voltages for Grids 1 and 2 should not vary with changes in power supply load. A separate power supply or other independant voltage source is advisable.
4. The driving stage should be capable of supplying these values at a low level of distortion.
5. Referenced to either tone without linearity-enhancing feedback.
6. When grid 1 is driven positive and draws current the listed values must not be exceeded. Other biasing methods must be used to provide the required extra bias without increasing grid 1 resistance if these values are insufficient to provide the desired operating bias.
7. It is recommended that the screen voltage be modulated with the plate voltage. This can be accomplished through the use of an independent modulated power supply or a series resistor from the plate voltage supply.
8. Grid 1 bias should be generated by either grid resistor or combination grid resistor and cathode-bias resistor methods.

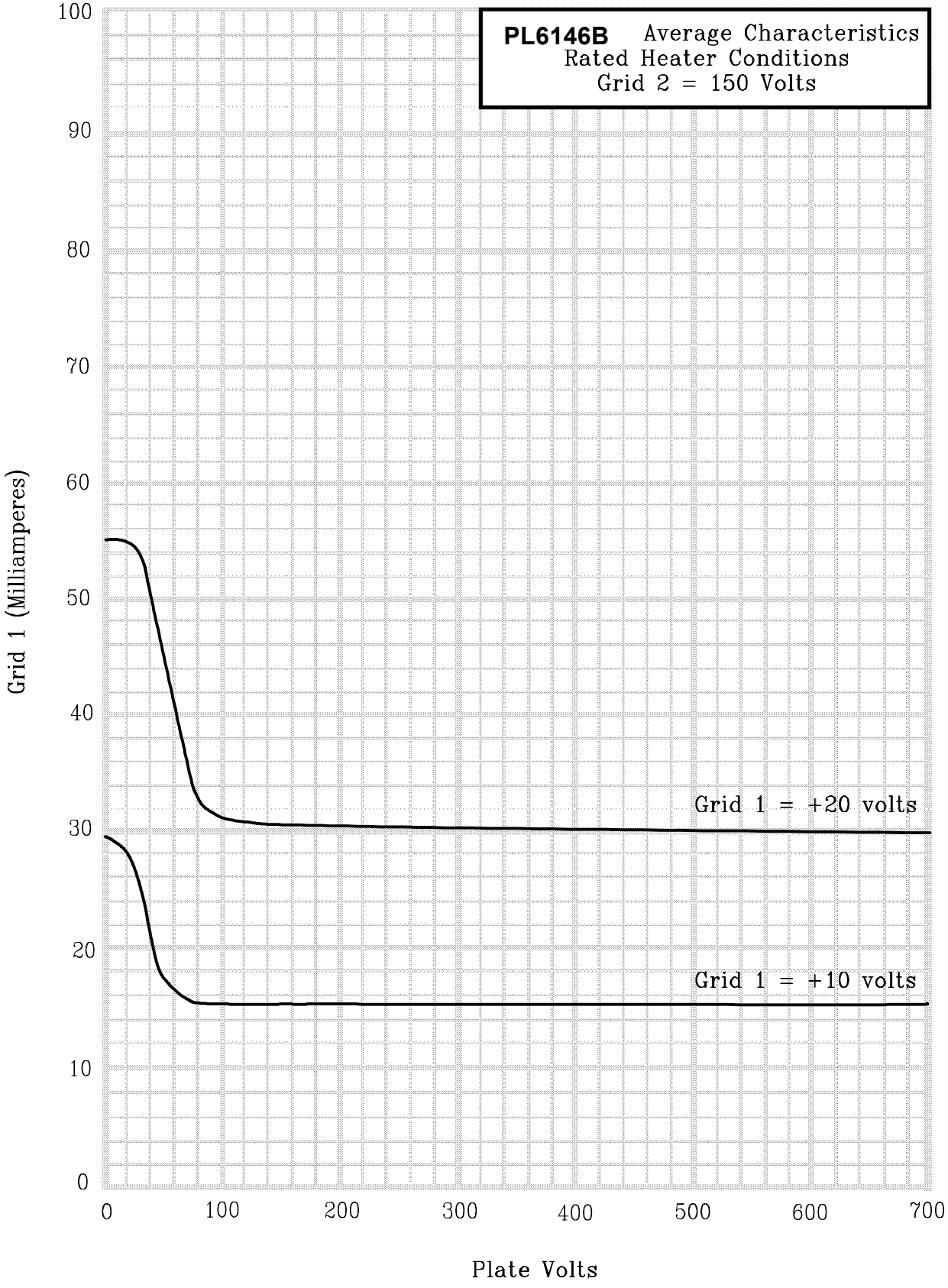


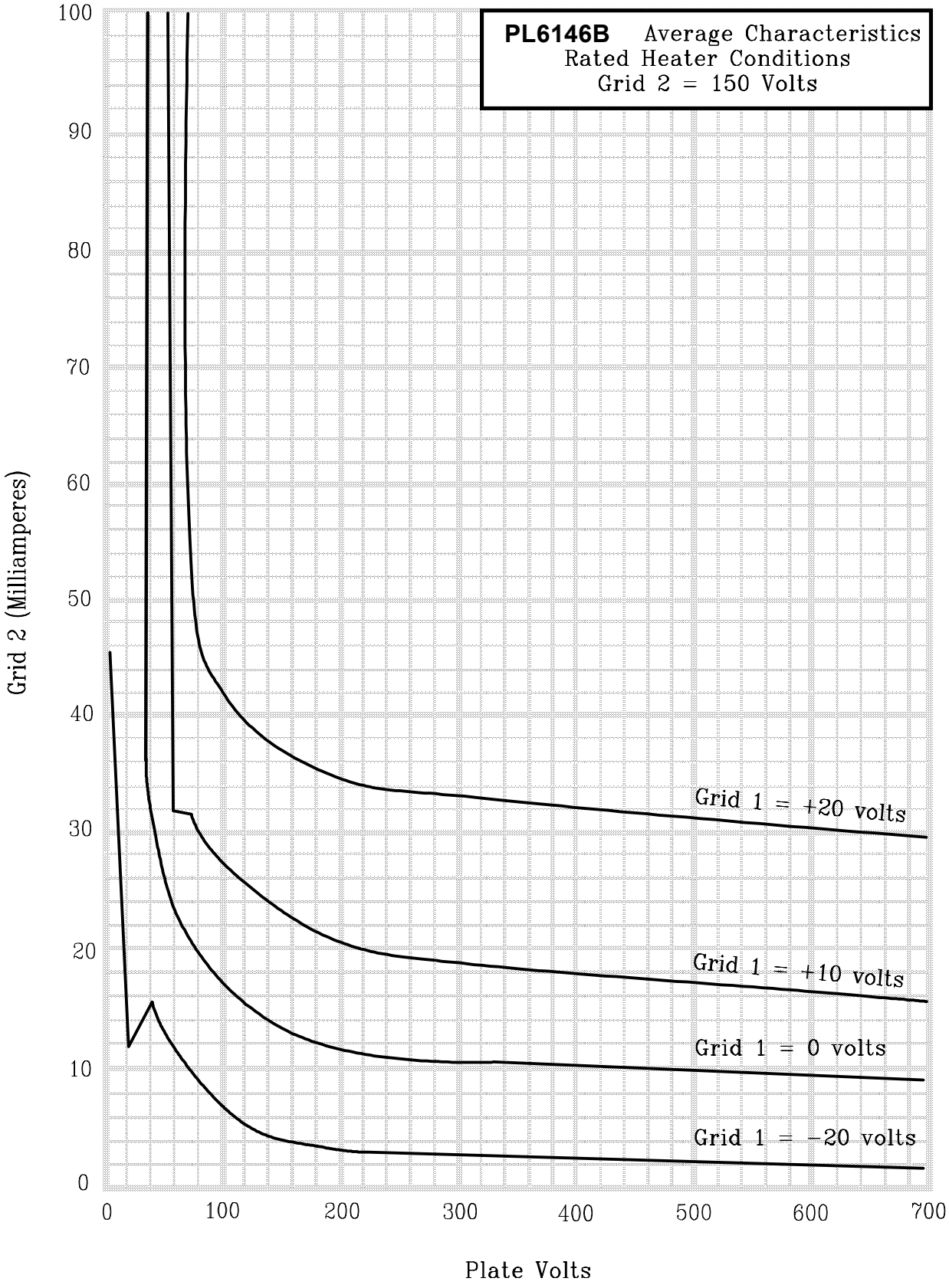


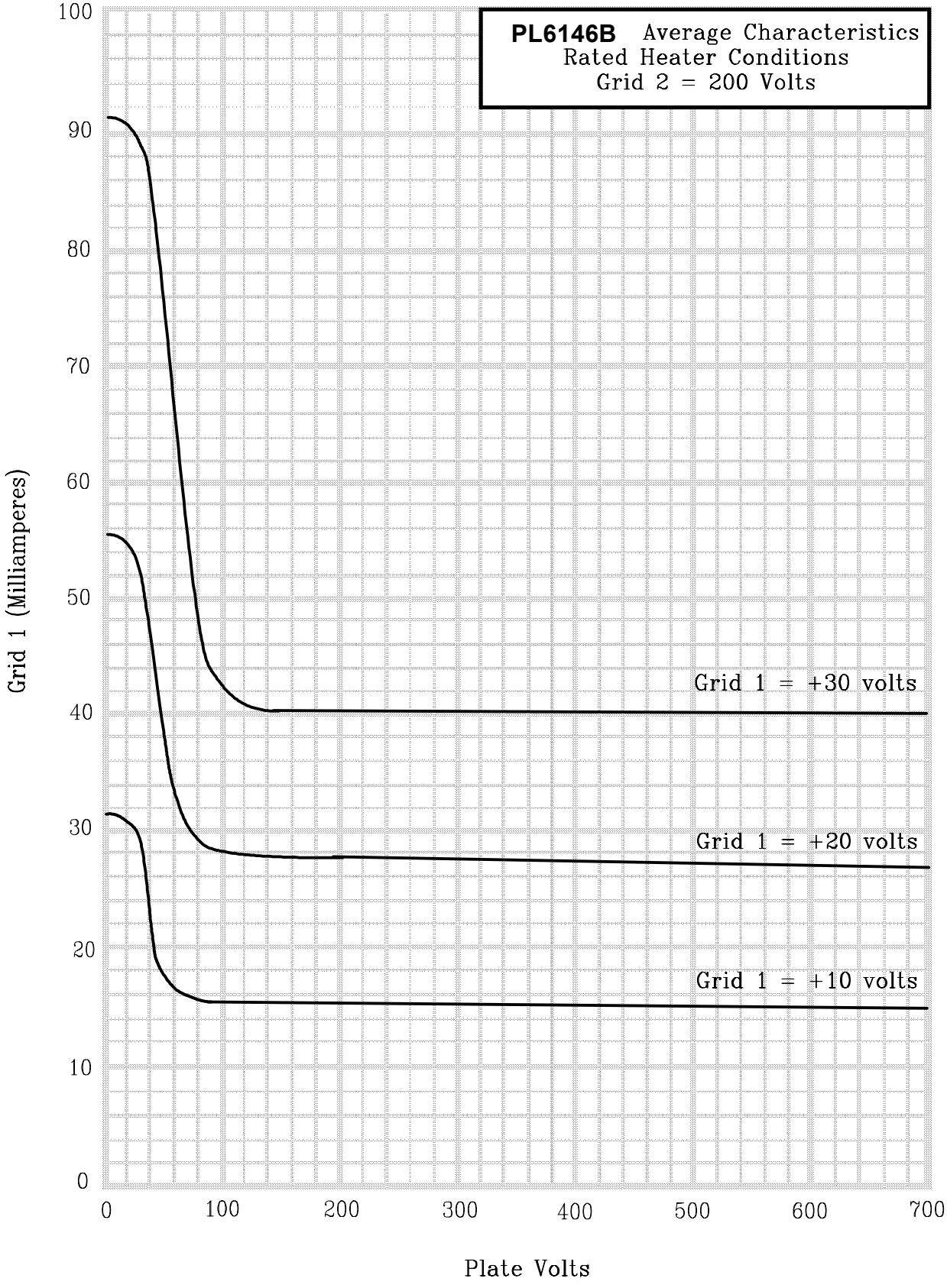
Dimensions

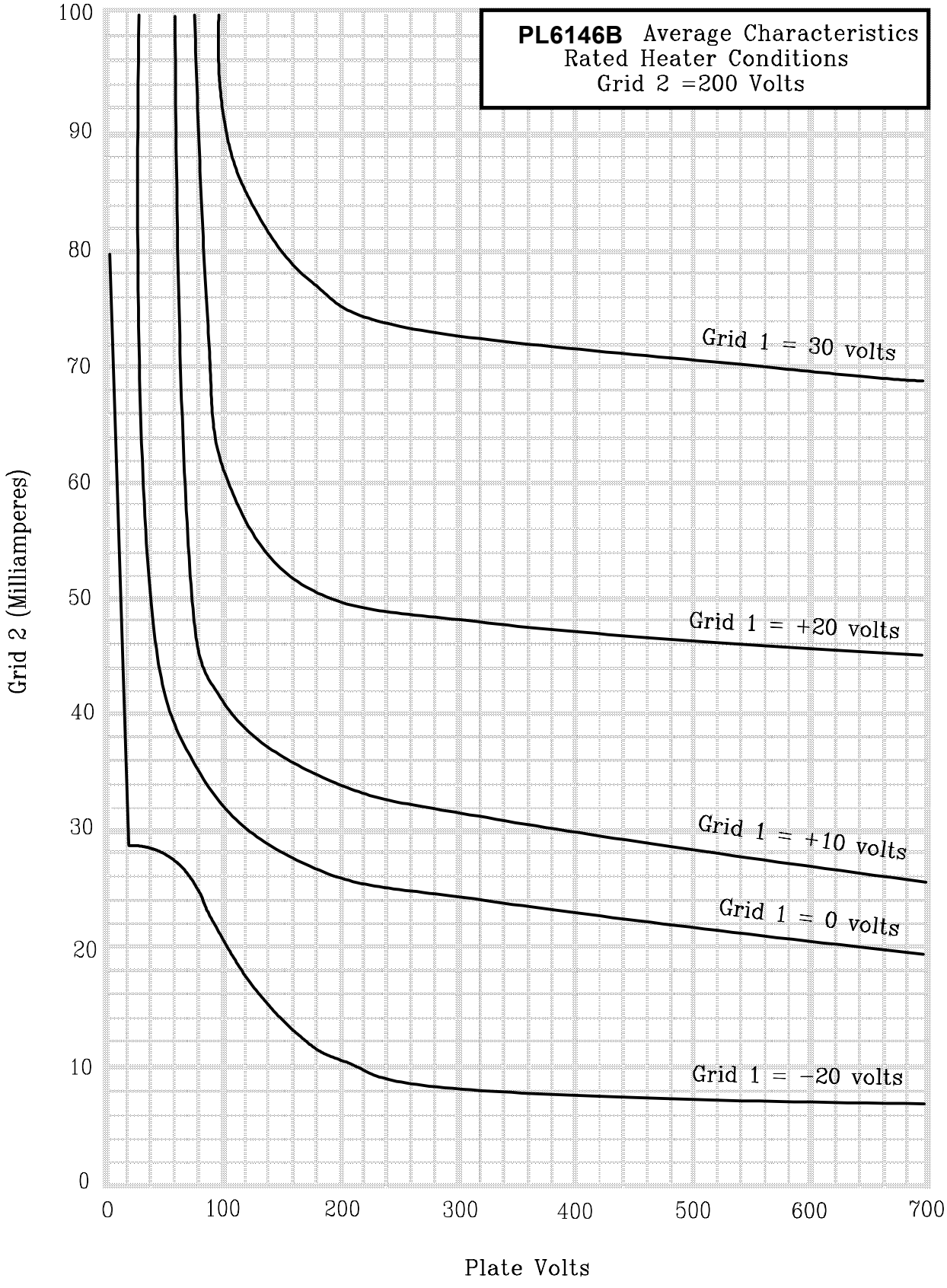
millimeters calculated from inches

	Inch	mm	
A	1.563	39.70	Max
B	1.656	42.06	Max
C	3.500	88.90	Max
D	4.125	104.78	Max


PL6146B Average Characteristics
Rated Heater Conditions
Grid 2 = 150 Volts
Grid 1 = +20 volts
Grid 1 = +10 volts
Grid 1 (Milliamperes)
Plate Volts
100
90
80
70
60
50
40
30
20
10
0
0
100
200
300
400
500
600
700


PL6146B Average Characteristics
Rated Heater Conditions
Grid 2 = 150 Volts
Grid 2 (Milliamperes)
100
90
80
70
60
50
40
30
20
10
0
0
100
200
300
400
500
600
700
Plate Volts
Grid 1 = +20 volts
Grid 1 = +10 volts
Grid 1 = 0 volts
Grid 1 = −20 volts


PL6146B Average Characteristics
Rated Heater Conditions
Grid 2 = 200 Volts
Grid 1 = +30 volts
Grid 1 = +20 volts
Grid 1 = +10 volts
Grid 1 (Milliamperes)
Plate Volts
0
10
20
30
40
50
60
70
80
90
100
0
100
200
300
400
500
600
700


PL6146B Average Characteristics
Rated Heater Conditions
Grid 2 =200 Volts
Grid 1 = 30 volts
Grid 1 = +20 volts
Grid 1 = +10 volts
Grid 1 = 0 volts
Grid 1 = −20 volts
Grid 2 (Milliamperes)
Plate Volts
0
10
20
30
40
50
60
70
80
90
100
0
100
200
300
400
500
600
700